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Cover: Mexican treefrogs, *Smilisca baudinii*. Photograph by Alan Kardon.

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Notes on Mexican Herpetofauna 13: DORs in the Municipality of Aldama, Tamaulipas, Mexico

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Abstract

One of the major agents of habitat fragmentation is the ever-expanding network of roads worldwide, increasing the mortality rates of all vertebrate groups. Two groups that are greatly affected are the amphibians and reptiles. Until recently (Lazcano et al., 2009), there were no studies done on road mortalities of herpetofauna in the northeast of Mexico. In order to continue documenting this anthropogenic phenomenon for this geographic portion the country, we examined the preserved herpetological collection of the UANL and our field records, focusing on specimens and records that have been collected in the municipality of Aldama, in the state of Tamaulipas, Mexico, during a 25-year period from 1984 through 2009. Our data base includes a total of ~372 specimens from Aldama which we organized into the following categories: alive on road (AOR), dead on road (DOR) and field records. A disproportionate number of the DOR records correspond to snakes that are deposited in the UANL collection and therefore we give special attention to this group of reptiles here. This study also provides a species list of the herpetofauna observed and collected in the municipality of Aldama with a total of 57 genera and 71 species recorded.

Resumen

Uno de los mayores agentes de la fragmentación del habitat es la siempre creciente y expansiva red carretera a nivel mundial, que incrementa los rangos de mortalidad en los grupos vertebrados. Dos grupos fuertemente afectados son los anfibios y reptiles. Hasta recientemente (Lazcano et al., 2009), escribió sobre un estudio de mortandad de estos grupos en carreteras en el noreste de México. Para continuar documentado este fenómeno antropogénico para esta porción geográfica del país, se analizó la colección herpetológica de la UANL y registros de campo, enfocándose en las especies que habían sido colectadas en Aldama, Tamaulipas, durante un periodo de 25 años de 1984–2009. Nuestra base de datos incluyó a un total de ~372 especímenes de Aldama, depositados en la colección preservada de la UANL, esta incluye: anura, caudata, lacertilia, serpentes, crocodrilia, y testudines. Para este análisis solamente se trabajaron las serpientes en la colección, estas se organizaron en las siguientes categorías: AOR, DOR, y campo. Aquí encontramos un total de 57 géneros y 71 especies.

Introduction

One of the major agents of habitat fragmentation is the ever-increasing and expanding road network worldwide (Forman et al., 2002). Mortality increases with traffic volume (Rosen and Lowe, 1994, Fahrig et al., 1995), and can be detrimental to various faunal groups including invertebrates (Haskell, 2001), amphibians (Carr and Fahrig, 2001), reptiles (Gibbs and Shriver, 2002), birds (e.g., Kuitunen et al., 1998), and mammals (Philcox et al., 1999). Roads and traffic can act as barriers, making animal movements difficult or even impossible, and reduce population connectivity. By diminishing gene flow and disrupting sink–source population dynamics, roads may increase inbreeding and loss of genetic diversity (Ferrerias, 2001). Roads promote high levels of animal–vehicle collisions and are one of the most visible man-made impacts on wildlife (Ascensão and Mira, 2005).

It has been hypothesized that amphibians and reptiles are

attracted to roads to elevate their body temperatures on cool nights following sunny days, because the road surface remains warmer than the ambient temperature (Dodd et al., 1989, Rosen and Lowe, 1994). The heat stored on the road surface is released into the atmosphere at night, turning the roads into “heat islands.” Animals respond to these heat islands: snakes for example, preferentially locate themselves on or near warm roads, increasing their risk of being hit by cars (Trombulak and Frissell, 1999). Roads cause plant community fragmentation as well, resulting in the isolation of many amphibians and reptiles species, and that might lead to a higher risk of local population extinctions due to stochastic effects (Van der Zande et al., 1980; Saunders et al., 1991; Fahrig and Merriam, 1994; Cooper and Walters, 2002; Gibson and Merkle, 2004).

Lazcano et al. (2009) recently reviewed some aspects of this anthropogenic phenomenon for the northeastern state of Nuevo

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León, Mexico, but road mortalities have never been examined in the neighboring state of Tamaulipas, and in fact very few publications of any kind are available concerning the herpetofauna of this state (Flores-Villela and Pérez-Mendoza, 2006). This study examines our collections (road collecting in particular), records, and observations of the herpetofauna from the municipality of Aldama, in the state of Tamaulipas, during a number of non-consecutive years between 1984 and 2009, where significant numbers of road kills were collected for the Universidad Autónoma de Nuevo León (UANL) preserved collection.

Materials and Methods

Study Area: Aldama is one of the 43 municipalities (equivalent to U.S. counties) that make up the geographical-political divisions of the state of Tamaulipas (Figure 1). It is located in the

southeast of Tamaulipas and encompasses approximately 1361 km². It is somewhat square but irregular in shape, and is approximately 62 km east to west and 75 km north to south at its widest points. The elevation ranges from sea level on the Gulf coast in the east to 1100 m in the Sierra de Tamaulipas in the northwest. As with all of the municipalities in Tamaulipas, a town bearing the same name as the municipality is the capital. The town of Aldama was founded in 1795 and is the largest in the municipality, with a population of ca. 27,676 (<http://www.aldama.gob.mx/> or INEGI II Conteo de Población y Vivienda, 2005). Other notable towns include: Nuevo Progreso and Higinio Tanguma located on Federal Highway 180, the major transportation corridor in the municipality; the coastal villages Rancho Nuevo, Barra del Tordo, and El Morón; Guadalupe Victoria, Las Yucas and San Andres in the Sierra de Tamauli-

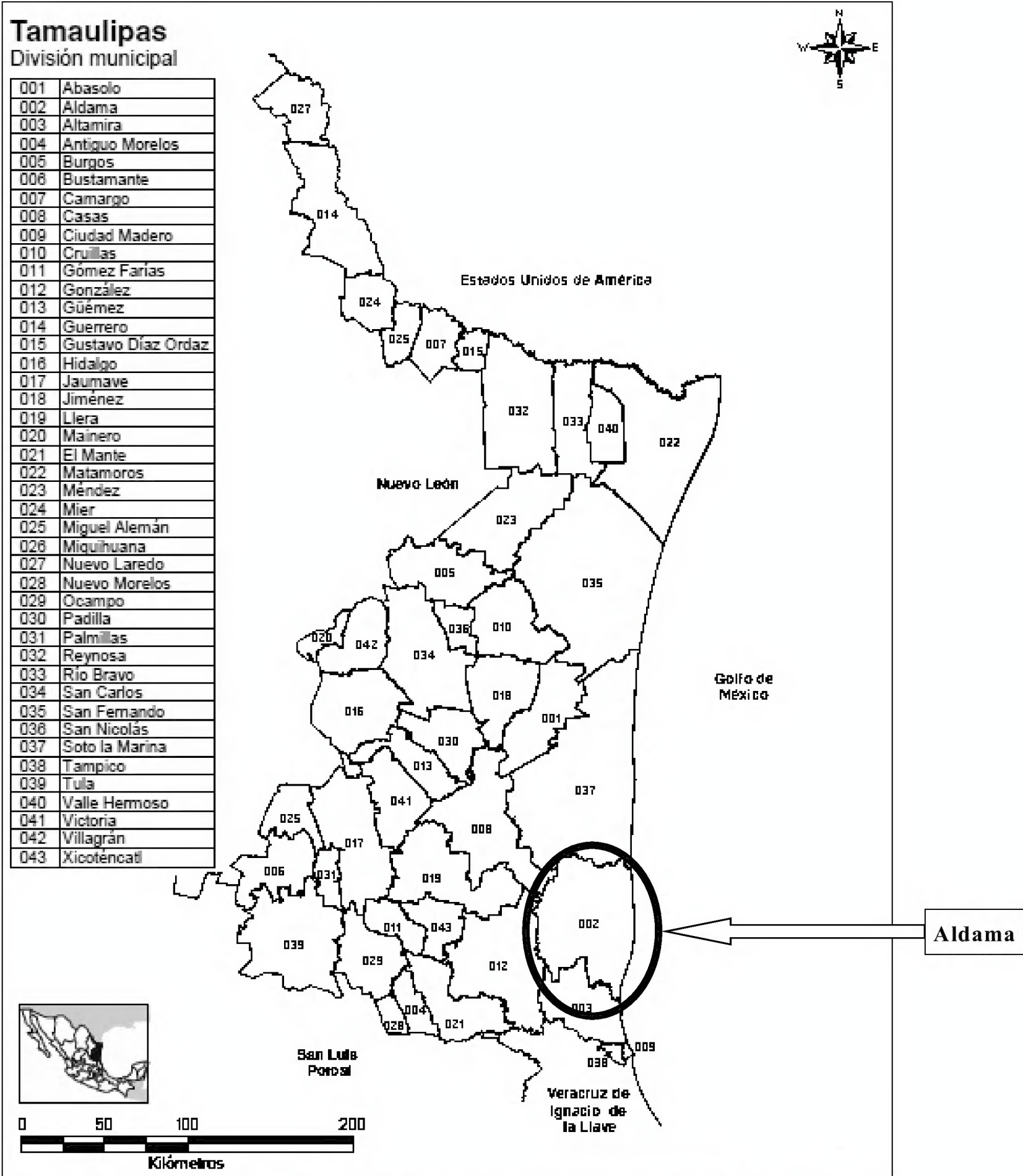
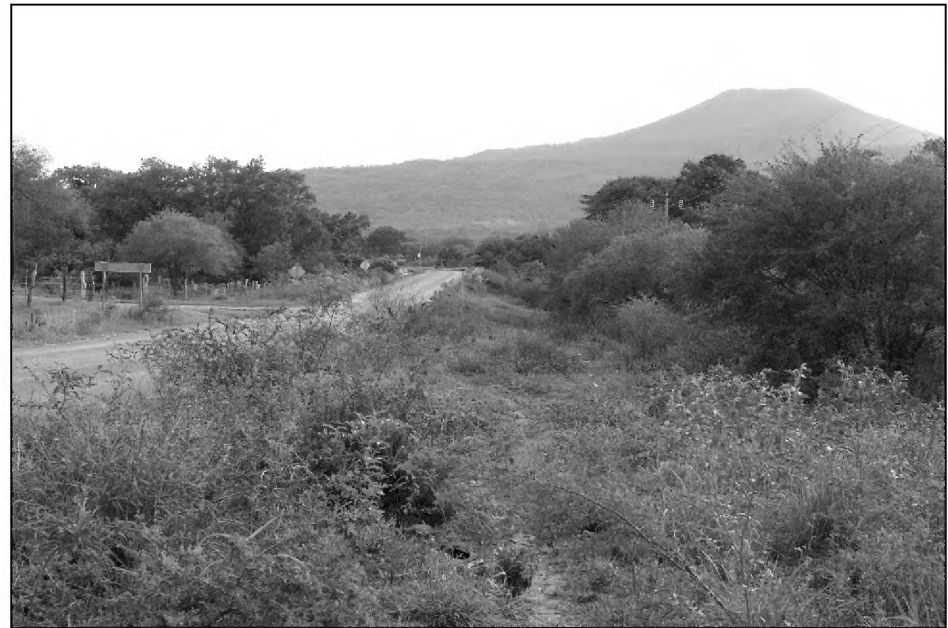


Figure 1. Map of the state of Tamaulipas and its 43 municipalities, where 002 corresponds to Aldama encompassing 1361 km². Source: INEGI Marco Geoestadístico Municipal 2005. [www.cuentame.inegi.org.mx]

pas; and the ranching communities of Francisco I. Madero, El Nacimiento, and Piedras Negras. Aldama is bordered by the municipality of Soto La Marina to the north, Altamira to the south, Casas, Gonzalez and Llera to the west, and the Gulf of Mexico to the east. The majority of the land is privately owned and cattle ranching is the main activity. Some farming, producing beans, maize, sorghum, and soy also contributes to the economy. The coast of the municipality has some very limited fisheries. Tourism is a significant part of the economy on the coast, where the beaches attract visitors to the region. The beaches most often visited are Barra del Tordo, Morón and Rancho Nuevo. The latter is the primary nesting beach of *Lepidochelys kempii* (Kemp's ridley sea turtle), and major conservation efforts are centered there. The nests are excavated, and the eggs are transported to protected areas on the beach, where they are hatched in situ and the juveniles are released in the Gulf of Mexico. Much has been documented regarding the conservation of these sea turtles by both Mexican and U.S. government institutions (Eckert et al., 1999; Lutz and Musick, 1997; Marquez M., 1989; Turtle Expert Working Group, 2000; U.S. Fish and Wildlife Service and National Marine Fisheries Service, 1992; U.S. Fish and Wildlife Service, 2000; <http://www.fws.gov/kempstridley>).

Climate: The northern border of Aldama lies approximately 15 km south of the Tropic of Cancer. The climate is hot, with temperatures commonly exceeding 35°C (95°F) from May through October. The winters are mild and freezing temperatures infrequent. Precipitation increases in the months of June through October, marking the wet season, but winter and spring rains are not unknown. In the east, the humidity is higher and coastal areas may receive higher rainfall due to the proximity to the Gulf of Mexico (García, 1981). Tropical depressions and hurricanes contribute significantly to the annual rainfall on the Gulf of Mexico. This helps give the coastal plain of southern Tamaulipas its tropical appearance, standing in contrast to the deserts of Mexican Plateau to the west of the Sierra Madre Oriental, which creates a rain shadow effect. The climate for the area can be consulted at (<http://smn.cna.gob.mx/productos/normales/estacion/tamps/NORMAL28003.TXT>) and the climate for the state can be consulted at (<http://smn.cna.gob.mx/productos/map-lluv/estados/est-2008.gif>).

Hydrology: The municipality is moderately arid, but there are three primary river drainages entering the Gulf of Mexico. From north to south these are: El Carrizal (and its tributaries Río Las Lajas, and Río San Pedro) El Tigre and El Barbarena. Secondary tributaries of the Río Carrizal were dammed to create an artificial lake, El Presa República Española, for a hydroelectric plant. This lake forms a portion of the border with the neighboring municipality of Soto la Marina to the north. Near the town of El Nacimiento are a series of cenotes or sinkholes: these are Alameda, Baños, Murciélagos, Poza Verde and Zacatón. The term cenote comes from the Mayan word *dzonot*, meaning abyss or hole in the ground and designates a natural well formed in permeable limestone terrain, particularly susceptible to the processes of water to dissolve rock. The magnitude and depth of the cenotes in Aldama greatly surpasses the cenotes of Yucatan. The most impressive is Zacatón, named after the free floating islets of living grass that flourish there. This cenote is the deep-



Southern coastal vegetation (tropical deciduous thorn forest or *bosque tropical caducifolio espinosa*) in Aldama, Tamaulipas. Photograph by Alan Kardon.

est water-filled cavity in the world, with an enormous opening 116 m in diameter and a depth of at least 330 m (Gary et al., 2002.). Below its calm and apparently still water is a natural tunnel 180 m long that connects to, and forms the source of, the Río Nacimiento. To the south, the Río Barbarena forms the border with the neighboring municipality of Altamira. On the coast the Río Tigre and Río Barbarena empty into Laguna San Andres, sheltered from the Gulf of Mexico by the Barra Chavarria. This area still harbors a few spots of mangrove forests. Two crater lakes, Los Soldados and La Pinta can be found in the volcanic Sierra de los Maratines northeast of Cd. Aldama.

Vegetation: Tropical thorn forest and tropical thorn scrub, dominated by acacias, mesquites, and cactuses, are the main vegetation types throughout much of Aldama. Extensive clearing of the vegetation by ranchers for cattle grazing makes it difficult to determine to what extent other vegetation zones occurred in the region. Riparian areas still support tropical deciduous forest and lush gallery forest and locals indicated to us that the tropical deciduous forest was much more extensive in recent decades, before cattle ranching expanded. Jean Louis Berlandier (1980), who passed through the area in 1831, described the area between the towns of Altamira and Aldama as having “some immense forest, broken by small prairies” dominated by oaks (*Quercus oleoides*), and “immense prairies” being burned for pasture. Goldman (1951), described visits to adjacent areas of the municipality of Altamira to the south in 1898, stating “About 10 miles north of Altamira open grassy plains begin and reach away to the north indefinitely.” Goldman (1951) also described forest “here and there” on these plains in “strips that may be several miles wide” with oak trees and *ojite* (*Brosimum alicastrum*) as significant components. Remnants of these vegetation types can still be found in the southern areas of the municipality, among the cropland and ranches. Dry oak forest still occurs in the Sierra de los Maratines northeast of the town of Aldama although much of this has been cleared for grazing as well. Palm trees are sometime seen scattered across the landscape at lower elevations and occasionally these occur in groves that might be described as palm forest, but to what extent these occurred in the past is unclear. Martin et al. (1954) provided an account of the Sierra de Tamaulipas including descriptions of the vegetation zones and the herpetofauna, describing



Mangrove forest on the coastline of Aldama, Tamaulipas. Photograph by Alan Kardon.

tropical deciduous forest occurring between 300 and 700 m, limited areas of montane scrub at 600–900 m, and pine-oak forest above 800 m. Although Martin's study area was centered around the town of Acuña and areas in the adjacent municipalities of Casas, Gonzalez and Llera, his descriptions are applicable to the portions of the Sierra de Tamaulipas in Aldama as well. The mangrove swamps form another interesting plant community, although limited in extent. These swamps, include red (*Rhizophora mangle*), white (*Laguncularia racemosa*), and

black (*Avicennia germinans*) mangrove trees. Small patches can be found on the coastline, and these, being important habitat for migratory birds and a significant element when it comes to suppressing the actions of hurricanes on the coastline, should be considered important areas for conservation (CONABIO, 2008; Luther and Greenberg, 2009).

Orography: The eastern slopes of the Sierra de Tamaulipas, including Sierras el Naranjo and el Aguacate, occupy the north-west corner of the municipality with maximum elevations of ca. 1100 m in Aldama. A number of low volcanic mountain slopes and hillsides occur 5 or 6 km northeast of the town of Aldama. These include Cerro El Cautiva, Loma Cruz, Cerro Maratines, Cerro Nopal, Cerro El Perro and Cerro Valentines. This small mountain range was referred to as the Sierra de los Maratines by Berlandier (1980) but they are not identified as such on most contemporary maps. The maximum elevation there is about 660 m. Numerous other isolated peaks rise above the coastal plain, although seldom reaching above 360 m. Among them are Cerro la Bandera, el Jerez, Loma la Bueyes, el Cerro del Maíz, el Metate and La Sierrita. Valleys such as Azufrosa, Nuevo Progreso, el Zanampeño and ejido 5 de Mayo are found throughout the municipality.

Highways: Currently there are only four paved highways in the municipality of Aldama (Figure 2). However, the state of

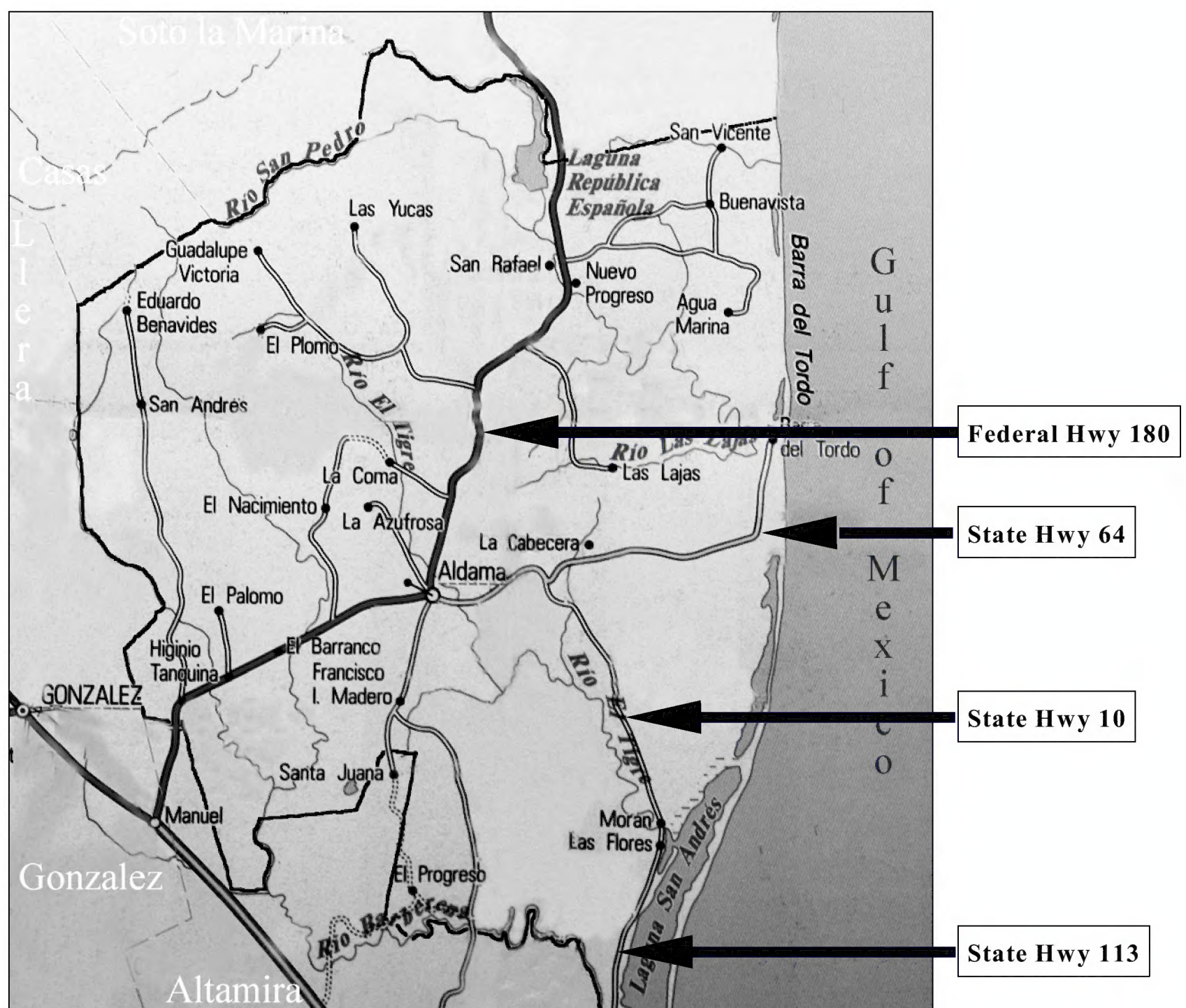


Figure 2. Map of the municipality of Aldama, Tamaulipas, Mexico (1361 km²). Source: http://www.e-cienciaytecnologia.gob.mx/wb2/eMex/eMex_Tamaulipas_3



Tamaulipas State Highway 64, as it appeared on 20 May 2007.
Photograph by William L. Farr.

Tamaulipas began an aggressive campaign of paving dirt roads in the last five or six years. Two of the roads discussed here were recently paved and more dirt and gravel roads are being paved throughout the state each year. We were unable to obtain statistical data pertaining to the volume and the frequency of traffic on these roads.

Federal Highway 180: A major Mexican highway running from Matamoros, Tamaulipas, at the U.S. border south along the Gulf Coast to Campeche, on the Yucatan Peninsula. Approximately 70 km of this highway crosses the municipality of Aldama north to south, and mostly transverses ranchland, tropical thorn forest and tropical thorn scrub in rolling hills at moderately low elevations. Although this highway is a major national corridor, it is only two lanes wide and lacks shoulders or emergency lanes. This, combined with a high volume of traffic, precludes safely road collecting for amphibians and reptiles there. However, a few specimens have been picked up there over the years of surveying in the municipality.

State Highway 64: This road runs ca. 47 km east-northeast from the town of Aldama, 130 m elevation, to the coastal fishing village of Barra del Tordo. The highway transects ranchland, tropical thorn forest and tropical thorn scrub as above but, also passes through the southern foothills of the Sierra de los Maratines at two points, some pastures, grassland and localized stands of old growth tropical deciduous forest near the coast, giving it a variety of habitats. The majority of the AOR and DOR records in this study are from this road.

State Highway 10: This road runs 27 km from its intersection with Hwy 64 south-southeast to El Moron. Heading south from Hwy 64, the first few kilometers pass through tropical thorn scrub and ranchland at an elevation of ca. 140 m, but soon the road descends an escarpment where it crosses the Río El Sabino (in the Río El Tigre drainage) supporting lush gallery forest along its banks. The remainder passes through ranchland, cropland and grassland until reaching the town of El Morón on the Río El Tigre near the coast. This road was paved as recently as 2006 and was previously mud and dirt and only rarely used for road collecting before that time.

State Highway 113: This highway runs ca. 17 km just above sea level, from the end of Highway 10 at El Morón on the Río El Tigre south to the Río Barberena, the municipality boarder with

Altamira, crossing ranchland, cropland, grassland, some marshes and occasionally estuary habitat near the Laguna San Andres. This highway was not surveyed before 2007. It was paved in 2006, and prior to that time there was no bridge over the Río El Tigre connecting it with El Morón.

The UANL Collection: This study is based on material in the UANL preserved collection and supplemented with our field records. The Facultad de Ciencias Biológicas de la Universidad Autónoma de Nuevo León holds in its preserved collection approximately 1216 specimens from Tamaulipas: 35 Caudata, 348 Anura, 4 Testudines, 310 Squamata—Lizards, and 519 Squamata—Snakes. However, recently the preserved herpetological collection from the ITCV (Instituto Tecnológico of Ciudad Victoria), Tamaulipas, Mexico has been acquired by UANL. This collection of ca. 700 specimens was mostly assembled by Dr. Pablo Antonio Lavín-Murcio and his students in the years 1985–2003 and over 90% of the material was collected in that state. This substantially increases the number of specimens (ca. 2000 total) and species richness, making this one of the largest collections of Tamaulipas material in the world (second only to the University of Michigan Museum of Zoology with ca. 4000 total), and provides us with a better understanding of the distribution patterns of the herpetofauna in this beautiful state. Our data base includes a total of ~372 specimens from the municipality of Aldama, Tamaulipas, including 148 specimens preserved in the UANL collection and 224 field records. Of these ~372 records, 161 (43.3%) are snakes: 14 (8.7%) AOR; 131 (81.4%) DOR; 16 (9.9%) field.

Specimens are catalogued in a computer spreadsheet with the following information: scientific classification (order, family, genus, species and subspecies), catalogue number, state, municipality, locality, date collected, field number, collector(s), and some basic morphological data including sex, snout–vent length and tail length. When available the following information is also included: coordinates, elevation, hour of collection, temperature at time of collection, weight (before preservation), field notes (habitat, microhabitat, weather, behavior, etc.), and some examination notes (scale counts etc.). The use of a computer spreadsheet is a powerful tool when it comes to recording and detailing information on large numbers of field records or museum collections.

In order to create a complete list of the species known to occur in the municipality of Aldama, we have included in Table 1 (in addition to UANL preserved collection specimens) our field records, animals we observed in the field (but did not collect) for which the above information was recorded and supported with a photo voucher. Museum and literature records were also reviewed, and four species were added that we did not encounter in our surveys, but which have previously been recorded from the municipality, namely: *Spilotes pullatus mexicanus*, (UF-49504 and UF-49506, specimens not examined); *Tropidodipsas f. fasciata*, (Kofron, 1987); *Caretta caretta* and *Dermochelys coriacea*, (Smith and Smith, 1979). Although the municipality of Aldama is entirely within the established distribution of the following eight species, we have no specific or confirmed records of them occurring there and we have not included them in Table 1: *Notophthalmus meridionalis* (Mecham,

Table 1. Numbers and relative abundance of AOR, DOR and field specimens found in the municipality of Aldama during the period 1984–2009. Taxonomy follows Liner and Casas-Andreu (2008) with the following exceptions: *Incilius nebulifer*, *Eleutherodactylus cystignathoides* and *E. guttillatus* follow Frost (2009); *Sceloporus cyanogenys* follows Martínez-Méndez and Méndez-de la Cruz (2007); *Opheodrys aestivus* follows Walley and Plummer (2000).
 ● = species found in surveys for which encounter rates were not recorded. * = introduced and probable introduced species.

Order (5)	Scientific names	Hwy 180		Hwy 64		Hwy 10		Hwy 113		Dirt roads			
Family (26)	(57 genera and 71 species)	AOR	DOR	AOR	DOR	AOR	DOR	AOR	DOR	AOR	DOR	Field	Total
Caudata													
Plethodontidae	<i>Pseudoeurycea cephalica</i>											7	7
Anura													
Bufonidae	<i>Incilius nebulifer</i>			●	●		●		●	●		●	●
	<i>Rhinella marina</i>			●						●		●	●
Eleutherodactylidae	<i>Eleutherodactylus c. cystignathoides</i>			●		●						●	●
	<i>Eleutherodactylus guttilatus</i>											9	9
Hylidae	<i>Ecnomiohyla miotympanum</i>											1	1
	<i>Scinax s. staufferi</i>			●		●						●	●
	<i>Smilisca baudinii</i>	●		●	●	●	●	●	●	●		●	●
	<i>Trachycephalus venulosus</i>			●	●	6	●	●	●			●	6+
Leptodactylidae	<i>Leptodactylus fragilis</i>					●						●	●
	<i>Leptodactylus melanonotus</i>			●		●						●	●
Microhylidae	<i>Gastrophryne elegans</i>											●	●
	<i>Hypopachus variolosus</i>	●		●				●		●		●	●
Ranidae	<i>Lithobates berlandieri</i>			●	●		●		●	●		●	●
	<i>Lithobates catesbeianus</i> *							1					1
Scaphiopodidae	<i>Scaphiopus couchii</i>			●		●				●			●
Squamata — Lizards													
Anguidae	<i>Ophisaurus incomptus</i>				1								1
Corytophanidae	<i>Laemactus s. serratus</i>									1			1
Gekkonidae	<i>Hemidactylus frenatus</i> *											●	●
Iguanidae	<i>Ctenosaura acanthura</i>											3	3
Phrynosomatidae	<i>Holbrookia p. propinqua</i>											●	●
	<i>Sceloporus cyanogenys</i>											26	26
	<i>Sceloporus grammicus tamaulipensis</i>											1	1
	<i>Sceloporus olivaceus</i>											1	1
	<i>Sceloporus variabilis</i>											27	27
Polychrotidae	<i>Anolis sericus</i>											4	4
Scincidae	<i>Plestiodon brevirostris dicei</i>											1	1
	<i>Plestiodon t. tetragrammus</i>											3	3
Teiidae	<i>Ameiva undulata</i>											22	22
	<i>Aspidoscelis scalaris gularis</i>											●	●
Xantusiidae	<i>Lepidophyma sylvaticum</i>											5	5
Squamata — Snakes													
Boidae	<i>Boa constrictor imperator</i>		1	1	2								4
Colubridae	<i>Coluber constrictor oaxaca</i>				2								2
	<i>Coluber flagellum testaceus</i>		2										2
	<i>Coluber m. mentovarius</i>				1								1
	<i>Coniophanes i. imperialis</i>		1										1
	<i>Drymarchon melanurus erebennus</i>		1	1	2					2	1	1	8
	<i>Drymobius m. margaritiferus</i>		3		4		1			1	4	2	15

Table 1 (cont'd).

Order (5) Family (26)	Scientific names (57 genera and 71 species)	Hwy 180		Hwy 64		Hwy 10		Hwy 113		Dirt roads		Field	Total
		AOR	DOR	AOR	DOR	AOR	DOR	AOR	DOR	AOR	DOR		
Colubridae (cont'd)	<i>Ficimia streckeri</i>		1										1
	<i>Imantodes cenchoa leucomelas</i>		1	1	2								4
	<i>Lampropeltis triangulum annulata</i>				3								3
	<i>Leptodeira annulata cussiliris</i>		2		12		1		3	2			20
	<i>Leptodeira s. septentrionalis</i>			2	5							1	8
	<i>Leptophis mexicanus septentrionalis</i>			2							1		3
	<i>Nerodia rhombifer blanchardi</i>				1							4	5
	<i>Opheodrys aestivus</i>				3								3
	<i>Oxybelis aeneus</i>				1							1	2
	<i>Pantherophis emoryi</i>		4		9		1		2		1		17
	<i>Pituophis catenifer sayi</i>		1										1
	<i>Pseudelaphe f. flavirufa</i>		1										1
	<i>Senticolis triaspis intermedia</i>											1	1
	<i>Spilotes pullatus mexicanus</i>												0
	<i>Storeria dekayi texana</i>		2		1								3
	<i>Thamnophis m. marcianus</i>				3		4		1				8
	<i>Thamnophis proximus</i>		6	2	16		1		1		1	5	32
	<i>Tropidodipsas f. fasciata</i>												0
	<i>Tropidodipsas s. sartorii</i>		2										2
Elapidae	<i>Micrurus tamaulipensis</i>											1	1
	<i>Micrurus tener</i> (<i>maculatus</i> or <i>microgalbineus</i>)			1	4							1	6
Viperidae	<i>Agkistrodon taylori</i>		1	1									2
	<i>Crotalus totonacus</i>		1				1				1		3
Crocodylia													
Crocodylidae	<i>Crocodylus moreletii</i>												0
Testudines													
Cheloniidae	<i>Caretta caretta</i>												0
	<i>Chelonia mydas</i>											1	1
	<i>Eretmochelys i. imbricata</i>											1	1
	<i>Lepidochelys kempii</i>											4	4
Dermochelyidae	<i>Dermochelys coriacea</i>												0
Emydidae	<i>Terrapene carolina mexicana</i>	1		1								1	3
	<i>Trachemys scripta elegans*</i>											1	1
	<i>Trachemys venusta cataspila</i>											33	33
Kinosternidae	<i>Kinosternon herrerae</i>											4	4

1968); *Rhinophrynus dorsalis* (Fouquette, 1969); *Gopherus berlandieri* (Auffenberg and Franz, 1978); *Kinosternon scorpioides* (Berry and Iverson, 2001); *Phrynosoma cornutum* (Price, 1990); *Leptotyphlops myopicus* (Dixon and Vaughan, 2003); *Coluber schotti ruthveni* (Camper, 1996); *Crotalus atrox* (Campbell and Lamar, 2004). And finally, we have included *Crocodylus moreletii* in Table 1, even though the species was

not observed in our field surveys and we are not aware of any specific museum or literature records for the municipality. We have included this species because the municipality of Aldama is entirely within the established distribution of the species (Ross, 1987), and numerous locals have informed us of the occurrence of *C. moreletii* there, including two (entirely independent) fishermen who were able to show us unequivocal

photographs of *C. moreletii* taken in the area, specifically in the Río Tigre in the vicinity of El Morón. We have observed *C. moreletii* in the Río El Barbarena in the neighboring municipality of Altamira as well as other areas of the state, and in some localized areas they are quite abundant.

The DOR (and other) specimens used in this review were collected opportunistically over a period of many years and the idea for writing an article on the subject appeared as an after-thought. It would be of great value if the area could be studied using more formal and systematic methods to quantify some of the effects that highways and road mortalities have on the herpetofauna. Road collecting was conducted primarily on the paved roads in the municipality. Road collecting was mostly (although not exclusively) conducted at night, which no doubt produces a bias for nocturnal and terrestrial species. Dirt roads, transecting every elevation and vegetation zone throughout the municipality, were primarily used to access field localities and less frequently used for road collecting. The earliest collections were made in 1984, then 1995–1997, and then continued annually from 2000 through 2007, and in 2009. The number of field days varied annually from 1 to 8 days, taken opportunistically (not systematically), as job and work schedules permitted.

In addition to the ITCV collection assembled by the third author and described above, the senior author conducted formal statewide surveys of the herpetofauna of Tamaulipas in the years 1996–1998, and the second author also conducted statewide surveys in the years 2003–2007.

One reason Aldama was selected for this review is the large number of specimens collected there over an extended time span and deposited in the UANL collection. It is also one of the largest and most beautiful municipalities of the state. Compared to some areas in southeastern Tamaulipas, agricultural development is less extensive in Aldama, where ranching and cattle grazing have preserved some good (if not altered) habitat, allowing the herpetofauna to thrive. Some of this remaining habitat is crossed by State Highway 64. The human impact on the vegetation in the municipality is extensive and much of what remains is secondary growth. One can only imagine how these plant communities, covering much of the area in the 19th century, appeared to early naturalists and collectors like Nelson and Goldman who surveyed Mexico from 1892 through 1906 (Goldman, 1951), and Berlandier, who made Tamaulipas his home in 1829 and died there in 1851 (Berlandier, 1980; Smith et al., 2003).

The data base was analyzed and records were grouped into the following categories: AOR (alive on road), DOR (dead on road), and field collected / observed records. The road of origin was determined for each specimen and a series of tables were constructed.

Results

Table 1 lists the orders, families, genera and species recorded from the municipality of Aldama, Tamaulipas, followed by columns for each of the four paved highways, one column each for dirt roads and field collected / observed specimens. The relative abundance of species found AOR, DOR and in the field are shown here. The numbers of anurans are not given for most

Table 2. Numbers of snakes found for each year with collecting activity in the municipality of Aldama, with the average number of specimens found per days spent given in parentheses.

Year	Field days	AOR	DOR	Field	Total	# of species
1984	1	0 (0.00)	1 (1.00)	0 (0.00)	1 (1.00)	1
1995	1	0 (0.00)	1 (1.00)	0 (0.00)	1 (1.00)	1
1996	3	0 (0.00)	16 (5.33)	0 (0.00)	16 (5.33)	11
1997	2	0 (0.00)	9 (4.50)	0 (0.00)	9 (4.50)	7
2000	3	0 (0.00)	9 (3.00)	0 (0.00)	9 (3.00)	5
2001	8	2 (0.25)	13 (1.63)	0 (0.00)	15 (1.88)	9
2002	3	1 (0.33)	1 (0.33)	2 (0.67)	4 (1.33)	4
2003	4	1 (0.25)	9 (2.25)	3 (0.75)	13 (3.25)	7
2004	6	3 (0.50)	8 (1.33)	3 (0.50)	14 (2.33)	7
2005	4	1 (0.25)	4 (1.00)	4 (1.00)	9 (2.25)	6
2006	4	1 (0.25)	4 (1.00)	1 (0.25)	6 (1.50)	6
2007	6	4 (0.67)	12 (2.00)	3 (0.50)	19 (3.17)	16
2009	7	1 (0.14)	44 (6.29)	0 (0.00)	45 (6.43)	10
Total	52	14 (0.27)	131 (2.52)	16 (0.31)	161 (3.10)	28

species because many of these were often observed in such large numbers on rainy nights (AOR, DOR and choruses in the field) that we frequently only recorded species as present or absent at a given time and locality, and did not attempt to record accurate encounter rates for individuals. *Aspidoscelis scalaris gularis*, and *Holbrookia propinqua propinqua* were also seen in large numbers in the sand dunes on our frequent visits to the beaches, and accurate encounter rates were not recorded for these species. Likewise *Hemidactylus frenatus* were commonly seen on the walls of hotels, restaurants and homes, and they were not recorded individually.

Of the 30 species of snakes known from Aldama, 20 species (66.7%) were only seen on the roads and never observed in the field, compared to salamanders, which were never seen on the roads, and lizards and turtles which were rarely seen on the roads. Lizards and turtles were collected and observed DOR and AOR in other municipalities, although never in such large numbers as snakes. In addition to the two species of snakes identified above that are known to occur in Aldama but were not recorded in the surveys, seven species were only found once (*Coluber m. mentovarius*, *Coniophanes i. imperialis*, *Ficimia*

Table 3. Numbers of snakes found by month during 1984–2009 in the municipality of Aldama, with the average number of specimens found per days spent given in parentheses.

Month	Field days	AOR	DOR	Field	Total	# of species
April	2	2 (1.00)	0 (0.00)	2 (1.00)	4 (2.00)	4
May	10	3 (0.30)	11 (1.10)	5 (0.50)	19 (1.90)	13
June	13	3 (0.23)	53 (4.08)	2 (0.15)	58 (4.46)	15
July	11	2 (0.18)	42 (3.82)	4 (0.36)	48 (4.36)	20
August	2	0 (0.00)	2 (1.00)	0 (0.00)	2 (1.00)	2
September	7	3 (0.43)	14 (2.00)	1 (0.14)	18 (2.57)	10
October	7	1 (0.14)	9 (1.29)	2 (0.29)	12 (1.71)	9
Total	52	14 (0.27)	131 (2.52)	16 (0.31)	161 (3.10)	28

streckeri, *Pituophis catenifer sayi*, *Pseudelaphe f. flavirufa*, *Senticolis triaspis intermedia* and *Micrurus tamaulipensis*).

The most abundant species found was *Thamnophis proximus* with a total of 32 specimens recorded, of which 16 (50%) were found on State Highway 64. The second most abundant snake species recorded was *Leptodeira annulata cussiliris* (Duellman's cat-eyed snake) with 20 specimens, of which 12 (60.0%) were found on State Highway 64. A total of 17 *Pantherophis emoryi* (Great Plains ratsnake) were recorded, with 9 (52.9%) from State Highway 64. Eight *L. s. septentrionalis* were recorded. However, 16 *Leptodeira* (including 2 neonates) were found AOR in June 2009 that were not included in the data. *Leptodeira annulata cussiliris* and *L. s. septentrionalis* can only be distinguished by ventral scale counts, and these counts were not attempted on live animals on the roads at night. Considering this, *Leptodeira* were among the most frequently encountered snakes. On Federal Highway 180 only two *Leptodeira* (DOR) were collected. However, due to the high volume of traffic on this road, collecting activities were minimal there. Cat-eyed snakes were also found in abundance on State Highways 10 and 113, and with recent improvements (paving the dirt roads and the addition of a bridge across the Río El Tigre) there is a definite increase in the number of vehicles on these roads.

Table 2 shows for each year the numbers of snakes found and the average number found per day spent. The year 2009 was exceptional, coinciding with a low pressure front and abundant rain in the area that brought an end to the dry season of the previous months. Here we recorded a total of 45 specimens in seven days of road collecting. The maximum diversity of snake species recorded was in 2007, when 16 species were documented.

Table 3 summarizes by month and over all taxa the numbers of snakes found. The month with the most records was June with 13 collecting days. Of the 58 records for the month of

June, 53 (91.4%) corresponded to DOR snakes. July had the largest diversity of snakes with 20 species found. The onset of the rainy season (typically arriving in June, occasionally in late May), generates an increase in snake activity and movement.

Table 4 provides measurements of some individual snakes found on the roads of Aldama. Not all AOR and DOR specimens catalogued were used to create this table. A total of 104 specimens were examined, giving us the following data: 63 males (60.6%), 37 females (35.6%), and 4 undetermined (3.8%). It seems that males were more active and likely to be found as DORs than females. Movements and activities that may result in road crossings can differ between the sexes, and even among age classes, as well as species of reptiles and amphibians (Gibbs, 1998; Semlitsch, 2000; Carr and Fahrig, 2001; Andrews and Gibbons, 2005; Steen and Smith, 2006). This table gives an idea of the size and sex of snakes moving across roads in this area. For comparison, literature records of typical or maximum lengths are given for each species in the table.

The occurrence of DORs can be a catastrophic event for any vertebrate population around the world. Nevertheless; collecting DORs provides an excellent source of research material and information. Stomach contents of six DOR *Leptodeira annulata cussiliris* were examined and one specimen (UANL-7033) had a *Hypopachus variolosus*, another (UANL-7036) had an *Incilius nebulifer*, and four specimens (UANL-7034, 7035, 7046 and 7056) contained *Smilisca baudinii*. A gravid *Storeria dekayi texana* was found DOR (UANL-7028, SVL = 239 mm and TL = 67 mm) containing three smashed fully developed young.

Road collecting surveys conducted in June 2009 coincided with some of the first heavy rains of the year that stimulated explosive breeding and hyperactivity among several anuran species. Two species in particular, *Smilisca baudinii* (Mexican treefrog) and *Trachycephalus venulosus* (veined treefrog), were observed in large numbers AOR, DOR and in roadside ditches. The anurans' vocalizations were so loud you couldn't hear anything else but the calls of dozens of frogs. The explosive breeding habits and hyperactivity of several anuran species seemed to attract many snake predators, which appeared to be stimulated by the presence of their food source. The species observed were *Drymobius margaritiferus margaritiferus* (northern speckled racer), *Imantodes cenchoa leucomelas* (Cope's blunthead tree snake), *Leptodeira annulata cussiliris*, *Leptodeira s. septentrionalis*, *Leptophis mexicanus septentrionalis* (Tamaulipan parrot snake), *Nerodia rhombifer blanchardi* (Tampico diamond-backed watersnake), *Pantherophis emoryi* (Great Plains ratsnake), *Storeria dekayi texana* (Texas brown-snake), *Thamnophis marcianus marcianus* (Marcy's checkered gartersnake) and *Thamnophis proximus* (western ribbonsnake). Most DOR specimens had only recently been hit by vehicles. Collecting times varied from 20:45 to 04:00, as long as the intensity of the rain didn't impede road collecting, as this is a very narrow road. Air temperatures ranged between 24.4°C and 28.8°C, and road temperatures could fluctuate between 24:6°C and 29:8°C. Travel time between Aldama and Barra del Tordo (47 km) and Aldama and Barra El Moron (27 km) varied; our collecting speed was typically between 6 and 10 km/h.

Table 4. Lengths and sexes of snakes collected in the municipality of Aldamas, Tamaulipas, from 1984 through 2009. * indicates reported maximum length for the species. Literature sources for sizes: Campbell and Lamar (2004); Köhler (2003); Lee (1996); Rossman et al. (1996); Dixon and Werler (2005); Werler and Dixon (2000).

Taxon	Snout–vent length (mm)	Tail length (mm)	Total length (mm)	Sex	Sizes from literature (mm)
<i>Agkistrodon taylori</i>	564	122	686	♂	960
	690	130	820	♀	
<i>Boa constrictor imperator</i>	395	64	459	♂	~2000
	?	?	?	♀	
<i>Crotalus totonacus</i>	1250	87	1337	♀	1800
<i>Coluber constrictor oaxaca</i>	619	255	874	♀	1016
<i>Coluber flagellum testaceus</i>	420	150	570	?	2032*
<i>Coluber mentovarius mentovarius</i>	1550	530	2080	♂	2527
<i>Coniophanes imperialis imperialis</i>	263	126	389	♂	~300 SVL
<i>Drymarchon melanurus erebennus</i>	?	?	?	♂	2870*
	?	?	?	♀	
<i>Drymobius margaritiferus margaritiferus</i>	531	?	?	♀	1270*
	559	307	866	♀	
	614.7	255.3	870.0	♂ (7)	
<i>Ficimia streckeri</i>	202	44	246	♂	483*
<i>Imantodes cenchoa leucomelas</i>	450	192	642	♂	700 SVL
	492	209	701	♀	
	487	202	689	♂	
	587	287	874	♂	
<i>Lampropeltis triangulum annulata</i>	486	93	579	♂	1054*
	477	94	571	♂	
<i>Leptodeira annulata cussiliris</i>	463.4	121.9	585.3	♂ (9)	870
	484.5	113.6	598.1	♀ (6)	
<i>Leptodeira s. septentrionalis</i>	551	162	713	♂	984*
	510	157	667	♂	
	550.0	121.5	671.5	♀ (4)	
<i>Leptophis mexicanus septentrionalis</i>	751.2	457.4	1208.6	♂ (5)	~1380
<i>Micrurus tener maculatus</i>	325	51	376	?	1213*
	327	33	360	♀	
	540	86	626	♂	
	561	95	656	♂	
	521	96	617	♂	
<i>Nerodia rhombifer blanchardi</i>	562	214	776	♂	~1200 SVL
<i>Opheodrys aestivus</i>	380	223	603	♂	1159*
	464	280	744	♂	
<i>Oxybelis aeneus</i>	777	515	1292	♂	~1000
	855	?	?	♀	
<i>Pantherophis emoryi</i>	798.4	179.0	977.4	♂ (8)	1829*
	708.3	175.5	883.8	♀ (4)	
<i>Pituophis catenifer sayi</i>	667	87	754	♀	2740*
<i>Storeria dekayi texana</i>	246	?	?	♂	457*
	239	67	306	♀	
<i>Thamnophis marcianus marcianus</i>	453	133	586	♂	1079*
	415	?	?	♂	
	405	?	?	♂	
	435.8	155.3	591.1	♀ (4)	
<i>Thamnophis proximus</i> (<i>diabolicus</i> , <i>orarius</i> , <i>rutiloris</i>)	370	?	?	?	1232*
	396.1	175.1	571.2	♂ (9)	
	431.7	181.5	613.2	♀ (6)	
<i>Tropidodipsas sartorii sartorii</i>	450	115	565	♀	~450 SVL
	440	130	570	?	
	465	141	606	♂	



Smilisca baudinii (Mexican treefrog or *rana arboricola Mexicana*).
Photograph by Alan Kardon.

Discussion

Comments on the occurrence of *Crocodylus moreletii* in Aldama are noted above, and below are some brief notes on the other orders of herpetofauna in the municipality.

Caudata: Salamanders

Pseudoeurycea cephalica (referred to as *Pseudoeurycea sulcata* by Farr et al. [2007]) were recorded in the Sierra de Tamaulipas and Aldama for the first time in these surveys. *Notophthalmus meridionalis* was not recorded in the current surveys in Aldama but, this is likely due to the fact that we failed to invest adequate time and sampling methods for detecting this aquatic species. We did however find them to be moderately common at a few localities in some of the adjacent municipalities. *Siren intermedia* have previously only been documented in the municipalities of Matamoros and San Fernando in northeast Tamaulipas (Mecham and Mitchell, 1983) however, an isolated record of four specimens from 2 km east of Gutiérrez Zamora, Veracruz (Ramirez-Bautista et al., 1982), suggests they may occur throughout the northeastern coast of Mexico, including Aldama, but this remains to be established.



Trachycephalus venulosus (veined treefrog or *rana venulosa*).
Photograph by Alan Kardon.



Imantodes cenchoa leucomelas (Cope's blunthead tree snake or *cordelilla de Cope*). Photograph by Alan Kardon.

Anura: Frogs and Toads

Although frogs and toads were collected for the UANL preserved collection, the numbers of DORs were so large at times, only one individual of each species was collected to record the species as being present at that time and locality. *Lithobates berlandieri*, *Incilius nebulifer*, *Scaphiopus couchii*, and *Smilisca baudinii* are among the most abundant species in the municipality, as they are throughout much of the state. The distributions of *Ecnomihyla miotympanum* and *Eleutherodactylus guttillatus* in the municipality are restricted to higher elevations in the Sierra de Tamaulipas. A single specimen of *Gastrophryne elegans* was reported relatively recently from Tamaulipas (Sampablo-Brito and Dixon, 1998). However, this species was observed to be moderately abundant in recent surveys. A series of small choruses were observed in roadside ditches along highway 64 on the night of 11 September 2007. *Rhinophrynus dorsalis* was not recorded in the surveys although it should be anticipated to occur there as museum and literature records confirm its occurrence in adjacent municipalities. Martin et al. (1954) reported *Eleutherodactylus latrans* (= *Craugastor augusti*) in the Sierra de Tamaulipas from Acuña, in the neighboring municipality of Llera, and a juvenile was collected from that same area in the current surveys. The occurrence of this species should be anticipated in the Sierra de Tamaulipas of Aldama as well. A single *Lithobates catesbeianus* was observed AOR in Aldama in 2009 although it was not collected. This is the first observation of the species from the municipality (Farr et al., 2009).

Squamata—Lizards

The vast majority of lizards were recorded in the field. One exception was an *Ophisaurus incomtus* (lagartija sin patas or plain-necked glass lizard, UANL- 6824), which was collected DOR and greatly damaged in 2007 on *State Highway 64*. This species is known from only five specimens, two from Aldama (Farr et al., 2007), one from Victoria, Tamaulipas (Terán-Juárez, 2008), and two from the neighboring state of San Luis Potosi

(Holman, 1971). *Laemactus s. serratus* was observed only once in the surveys, crossing and dirt road at 14:00 h on 31 July 2005. Two species, *Plestiodon brevirostris dicei* and *Lepidophyma sylvaticum*, are restricted to higher elevations in the Sierra de Tamaulipas and have very limited distributions in the municipality of Aldama. Although Aldama is within its established distribution, *Phrynosoma cornutum* was not recorded there in the current surveys. However it was noted in other areas of the state to be one of the most frequent victims of highway mortality of all the species of lizards known to occur in Tamaulipas.

Squamata—Snakes

The only endemic species of amphibian or reptile known to occur in Aldama is *Micrurus tamaulipensis* (type locality: Sierra de Tamaulipas, Rancho la Saucita, ca. 50 km N Gonzalez, 750–1000 m elev., Tamaulipas, Mexico). However, this recently described species (Lavín-Murcio and Dixon, 2004) should be anticipated to occur in the adjacent areas of the Sierra de Tamaulipas lying in the municipalities of Casas, Gonzalez, Llera and Soto la Marina. *Leptotyphlops myopicus*, *Coluber schotti ruthven* and *Crotalus atrox* have not been recorded from Aldama, but all were found in the adjacent municipalities of Casas and Soto La Marina, and *C. atrox* were collected from González as well. Rossman (1970) and Rossman et al. (1996) indicated that a large portion of the state of Tamaulipas is a broad area of intergradation between three subspecies of *Thamnophis proximus* (*T. p. diabolicus*, *T. p. orarius*, and *T. p. rutiloris*). Most specimens from lower elevations and coastal areas in the municipality have characters that usually agree with *T. p. rutiloris*; however specimens from inland localities and higher elevations in and near the Sierra de Tamaulipas are more variable and we address *Thamnophis proximus* only at the species level here.

Testudines: Turtles

Turtles were predominantly found in the field and on beaches. Only *Terrapene carolina mexicana* (Caja Mexicana or Mexican box turtle) was observed AOR on two occasions, once crossing State Highway 64 in June of 2002, and once crossing Federal Highway 180 in May of 2005. The single specimen of *Trachemys scripta elegans*, which was collected while snorkeling in Poza Verde, was likely introduced to that locality. Two *Kinosternon herrerae* were found in about 2 hours of snorkeling in the Río Nacimiento and it is probably more abundant than Table 1 indicates because, this (snorkeling) and other sampling techniques for detecting aquatic species were not practiced frequently or evenly in the surveys. *Kinosternon scorpioides* was not recorded in Aldama in the surveys, although specimens were found (AOR and DOR) in the adjacent municipalities of Altamira and Gonzalez, and Iverson and Berry (1979) reported them from Soto la Marina to the north. *Gopherus berlandieri* were found to be locally abundant in the north of the state in some areas where appropriate habitat remained. However, they became increasingly rare the farther south we traveled and they were not recorded from Aldama in the surveys. As noted above, Aldama's beaches are the primary nesting beaches of *Lepidochelys kempii*, and *Caretta caretta* and *Chelonia mydas* nest there as well. Much less common are nests of *Eretmochelys i. imbricata*, and incidences of *Dermochelys coriacea* nesting on

the Aldama coast are also very rare (Chávez and Kaufmann, 1974).

Due to the fact that the coastline of the municipality is a very important area for marine turtle nesting, and the presence of the last remnants of mangrove forest, we asked the locals what herpetofauna had been observed and associated with the mangroves and beaches. They indicated that they had seen *Dryomarchon melanurus erebennus*, *Leptodeira* and *Thamnophis* species there. *Holbrookia propinqua propinqua* (keeled earless lizard) and *Aspidoscelis scalaris gularis* (Texas whiptail lizard) are both very abundant in sand dunes and can be observed there actively engaged in foraging for food, disputing territories, and engaging in courtship. Occasionally *Sceloporus variabilis* were observed on driftwood and fenceposts in the dunes. Although not recorded specifically in the municipality of Aldama, some other herpetofauna using coastal habitat in the region are perhaps worth noting. Farr et al. (2007) reported a DOR *Iguana iguana* associated with mangrove habitat in the neighboring municipality of Altamira to the south. To the north, in the neighboring municipality of Soto La Marina, a *Boa constrictor imperator* was found in the sand dunes and *Coluber flagellum testaceus* were found under driftwood on the beach, and in the dunes. Selander et al. (1962) reported *Gopherus berlandieri* from barrier islands north of Aldama in Tamaulipas.

We observed many DOR mammals such as *Didelphis virginiana* (opossum), *Conepatus leuconatus* (skunk) and various rodent species (Ceballos and Oliva, 2005), but one event during our 2009 trip was astonishing to us. Local ranchers had caught a female *Tamandua mexicana* (northern tamandua or lesser anteater, *oso hormiguero Mexicano*) and this was the first time any of us had seen this species in a quarter of a century of collecting in Tamaulipas. The local ranchers promised to release it the next day, a promise we hope they kept, as this is a very rare animal to see in the field at the northern limit of their range.

Conclusion

Continued surveys will likely increase the number of species recorded from Aldama. Unfortunately, without systematic, quantitative studies on the effects of roads on herpetofauna populations, we will never understand if the small patches of forest left in Aldama will provide adequate connectivity for genetic flow, or if there will be genetic isolation in the future. Maybe genetic isolation is already occurring; we don't know. Species that suffer high rates of mortality on roads are subject to fragmentation in situations where insufficient numbers of individuals successfully cross to maintain the necessary population dynamics (Andrews and Gibbons, 2005). Aldama could be an example of such a case. Will climate change exert another burden on the wildlife, the herpetofauna in particular? We can infer from our results that anurans and snakes in Aldama are relatively more affected by roads than the other groups of amphibians and reptiles. The data provided here could be a useful source of information for ecological and conservation programs that the municipality could establish. With growing human populations, paving of rural roads, continued clearing and burning of what habitat remains, and urbanization, the future doesn't look promising for the herpetofauna. This is a worldwide phenomenon and there are remedial actions that can be, and in some cases are being, taken. However, human needs

rarely come in second to the needs of wildlife or conservation. This is human nature and little can be done. We only hope that Mexico's biodiversity will not vanish for future generations because governmental authorities and the general population were filled with apathy and indifference for nature and conservation.

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What You Missed at the November Meeting

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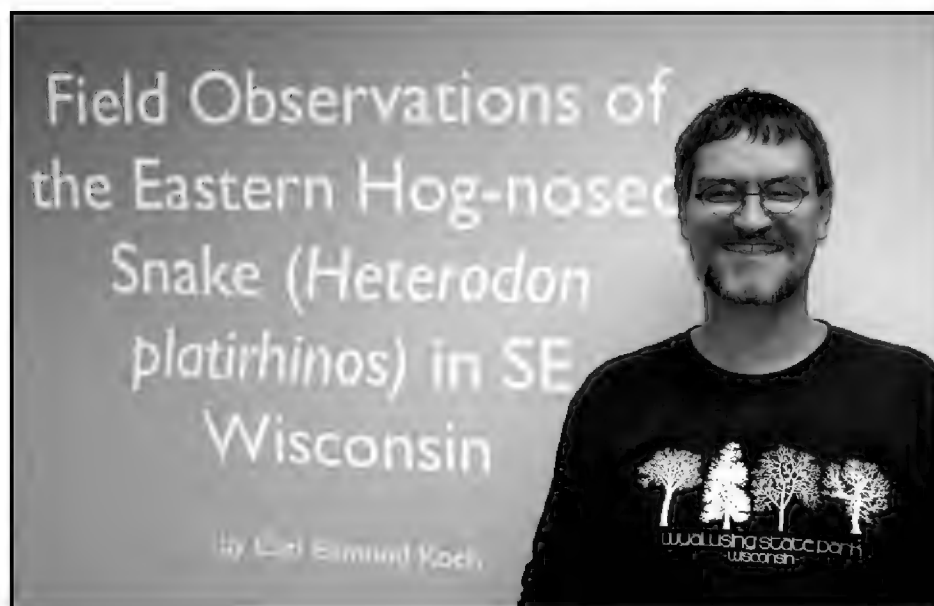
Sorry to disappoint all of you who look forward each month to John Archer's entertaining account of the previous month's CHS meeting. John didn't make it to the November meeting. I much prefer editing to writing, but Carl Koch's program was just too good to go unremarked, so I've come up with a brief recap..

Carl lives in a suburb of Milwaukee, Wisconsin, but nevertheless he's an active CHS member, attending many meetings and even contributing to the *Bulletin* earlier this year with "The Year of the Hognose" [Bull. Chicago Herp. Soc. 44(2):17-20].

Unlike many of our speakers, Carl is not a professional herpetologist. His interest in nature was spurred early on by a big brother, and later by Rob Carmichael of the Lake Forest Discovery Center. He began by telling us about some of his early encounters with eastern hog-nosed snakes, which were few and far between.

The numerous observations of hognose behavior that Carl proceeded to share with us all took place within 40 minutes of his home. Carl had been familiar with the general area for a long time, and had suspected that hog-nosed snakes were present there, but it was not until he saw a post on FieldHerpForum a couple of years ago that he was able to zero in on the specific localities where he has been so successful.

When it comes to snakes with interesting behaviors, hog-nosed snakes (or as Carl affectionately refers to them, "hogs") have few rivals. When disturbed, their repertoire includes



Photograph by Dick Buchholz.

flattening the neck into a cobra-like hood, striking vigorously (although inaccurately) with the mouth shut, hissing loudly, gaping widely, and of course feigning death.

Carl showed us great photos of nearly all of the above behaviors (strike and hisses are tough to photograph). But anyone who's ever disturbed a hognose in the field has seen one or more of those defensive behaviors. The really interesting stuff was the burrowing that Carl has been able to observe repeatedly. This he illustrated not only with photos, but also with remarkable videos. It's hard to believe how efficient these legless creatures are at moving sand unless one has seen it in person or in a video.

Carl has seen burrowing only in late June and early July, always between 5 P.M. and the onset of darkness. He is confident that it is nesting behavior. He has seen many different snakes digging and all appear to be gravid females. But the only time he tried to dig up a burrow he did not find any eggs. He did show one photo, however, of an egg that had been laid at the mouth of one of the burrows. And Carl has found newly hatched baby hog-nosed snakes at these sites in September.

Other interesting herps occur in the area. Carl showed photos of some of these, including a central newt, a blue-spotted salamander, a tiger salamander, a pickerel frog, a smooth green-snake and a Blanding's turtle. And we also were treated to photographs of many beautiful wildflowers that occur there. All of these photos were taken at or quite close to the sandy areas frequented by the hognoses.

For me, yet another highly enjoyable feature of this program were the photos showing many of Carl's companions in the field. Carl is always ready and willing to share this experience with fellow herp enthusiasts, and many of us have taken him up on it.

At this meeting we also held our annual election of officers and members-at-large of the CHS board of directors. Results were as follow: President, John Archer; Vice-president, Rick Hoppenrath; Treasurer, Andy Malawy; Recording Secretary, Cindy Rampacek; Corresponding Secretary, Deb Krohn; Publications Secretary, Aaron LaForge; Membership Secretary, Mike Dloogatch; Sergeant-at-arms, Dick Buchholz; Members-at-large (4), Jim Foster, Lawrence Huddleston, Linda Malawy and Jenny Vollman. Sad to say, only two of these positions were contested. And only three people will be serving on the 2010 board who did not also serve on the 2009 board. Our society could really benefit from a little more active participation, folks. Attend a board meeting during the coming year. You might find to your surprise that you actually enjoy it. Think about it.



Carl told us that this sort of gaping is a defensive behavior that he sees only infrequently in eastern hog-nosed snakes. Clearly visible in this photo at the rear of the upper jaw is the enlarged tooth that gives this genus the name *Heterodon* (= "different tooth").

Herpetology 2009

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

BURMESE PYTHON AS A FULL SPECIES

H. J. Jacobs et al. [2009, Sauria 31(3):5-16] reassess the taxonomic status of the Burmese python (*Python molurus bivittatus*) and elevate it to specific rank again. The population from Sulawesi, Indonesia, is a dwarf form of this giant snake that is redefined as a new subspecies, *Python bivittatus progschai* [in German]

HABITAT SELECTION BY FLORIDA COACHWHIPS

B. J. Halstead et al. [2009, Herpetologica 65(3):268-279] note that the use of space by individual animals strongly influences the spatial extent, abundance, and growth rates of their populations. This study analyzed the spatial ecology and habitat selection of *Masticophis flagellum* (the coachwhip) at three different scales to determine which habitats are most important to this species. Home ranges and mean daily displacements of *M. flagellum* in Florida were large compared to individuals in other populations of this species. Home ranges contained a greater proportion of Florida scrub habitat than did the study site as a whole, and individuals selected Florida scrub habitat within their home ranges. For both selection of the home range within the study site and selection of habitats within the home range, mesic cutthroat and hydric swamp habitats were avoided. Standardized selection ratios of Florida scrub patches were positively correlated with lizard abundance. Several non-mutually exclusive mechanisms, including foraging success (prey abundance, prey vulnerability, and foraging efficiency), abundance of refugia, and thermoregulatory opportunity may underlie the selection of Florida scrub by *M. flagellum*. Historic rarity and anthropogenic loss and fragmentation of Florida scrub habitat, coupled with the long-distance movements, large home ranges, and selection of Florida scrub by *M. flagellum*, indicate that large contiguous tracts of land containing Florida scrub will be essential for the persistence of *M. flagellum* in central Florida.

HOW MALE SALAMANDERS REMEMBER INTRUDERS

N. R. Kohn and R. G. Jaeger [2009, Behaviour 146(11):1485-1498] note that the use of multiple cues can enhance the detection, recognition, discrimination, and memorability of individuals. The authors conducted two experiments, using only males, to test whether territorial red-backed salamanders, *Plethodon cinereus*, could use only chemical or only visual cues to remember familiar conspecifics. In both experiments, focal males spent significantly more time threatening unfamiliar than familiar male intruders. They also chemoinvestigated the filter paper containing chemical cues of unfamiliar intruders more often than that of familiar intruders. These results suggest that red-backed salamanders can use both chemical and visual cues to recognize familiar individuals, allowing them to distinguish between less threatening neighbours and more threatening intruders in the heterogeneous forest floor habitat, where visual cues alone would not always be available.

NATTERJACKS IN LUXEMBOURG

A. C. Frantz et al. [2009, The Herpetological Journal 19(2): 53-59] report that the natterjack toad (*Bufo calamita*) has experienced a dramatic decline in Luxembourg over the last 100 years. Today, only two remnant populations are known. This study examined their genetic constitution at 10 microsatellite loci in order to assess the genetic risk from isolation and inbreeding to the species' long-term survival in the country. Genetic diversity in both populations was relatively high, and no evidence was found for inbreeding. However, the natterjack toads have experienced a recent reduction in their effective population sizes, and there was no evidence of recent gene flow between the two localities. The main short-term objective of conservation measures should be to increase population sizes by continuous safeguarding and management of the two sites.

SIZE DIMORPHISM IN BULLSNAKES

J. M. Kapfer [2009, Herpetological Conservation and Biology 4(3):353-357] notes that many studies exist on the evolutionary significance of sexual size dimorphism (SSD) in reptiles. Yet, this phenomenon has received little attention in members of the snake genus *Pituophis*. The author investigated if SSD occurs in bullsnares (*Pituophis catenifer sayi*) sampled at a site in southwestern Wisconsin, by analyzing adult length and calculating the Sexual Dimorphism Index (SDI) for individuals encountered from 2003 to 2005. Male length in the study population was statistically larger than female length. Where possible, the author also calculated SDI for sizes reported by other studies on members of this genus. The calculated SDI had a male bias in 75% of these other studies. The male bias found in the author's sample was greater than the values calculated for other published reports on *Pituophis* species and subspecies.

SYSTEMATICS OF THE GENUS *HYLA*

X. Hua et al. [2009, Herpetologica 65(3):246-259] note that the treefrog genus *Hyla* consists of at least 31 species found in North and Central America, Europe and Asia. Despite intensive work on the phylogeny of the genus in the past few years, several problems still exist regarding relationships within *Hyla*. These problems include the unusual placements of *H. gratiosa* and *H. walkeri* in some recent studies and the relatively limited taxon sampling of Asian species. This study revisits the phylogeny of *Hyla* to address some of these problems. The unexpected placements of *H. gratiosa* and *H. walkeri* were tested by sampling additional individuals of these species. The unusual placements of *H. gratiosa* and *H. walkeri* in previous studies were most likely due to a mislabelled tissue sample and a misidentified specimen, respectively. Two species of Asian *Hyla* were included in this study that had not been included in previous phylogenies. This study provides additional evidence for two separate colonizations of *Hyla* from the New World into Asia, and suggests an unusual biogeographic pattern in the Asian *Hyla* clades.

Unofficial Minutes of the CHS Board Meeting, November 13, 2009

The meeting was called to order at 7:37 P.M. at the Schaumburg Public Library. Board members Dan Bavirsha and Brad Trost were absent.

Officers' Reports

Recording Secretary: Cindy Rampacek read the minutes of the October 16 board meeting, minor corrections were made and the minutes were accepted.

Treasurer: Andy Malawy presented the financial reports, minor questions were raised and the reports were accepted.

Membership Secretary: Mike Dloogatch shared the names of recently expired members with the board. Mike feels membership will stay level for this month.

Vice-president: Jason Hood raised the question of a food budget for the December holiday meeting. After discussion, Aaron LaForge moved that we allot \$200 for the food for the December meeting. Andy Malawy seconded the motion. The motion passed unanimously.

Corresponding Secretary: Deb Krohn asked for Matt Goode's mailing address so she could send a thank-you note. Deb is working on the MHS thank-you notes as well.

Publications Secretary: Aaron did not do any work on the logo. Jason mentioned that a many spammers have been attempting to intrude on our forum. Aaron has updated the grants page.

Sergeant-at-arms: In Dan Bavirsha's absence it was reported that there were 58 people at the October meeting.

Committee Reports

Shows:

- Great Lakes Pet Expo, Saturday, February 6, 2010
- Project Exploration Dinner with a Dinosaur, March 12, 2010

Garfield Park Conservatory "Creatures of the Night," October 31, went well. John Archer, Bob Bavirsha, Dick Buchholz and Jenny Vollman and Bob did it and enjoyed it.

Old Business

CHS Library: Mark Ericson has volunteered to organize our library and create a database. This is much appreciated.

New Business

A lively discussion ensued regarding the need for a position statement on the current legislative action and movement against the herp industry. Cindy presented a very basic statement her rescue has used when needed. Rich Crowley offered to put something together to start with.

Linda has purchased some snake window-clings that she thinks should sell well at 'Fest.

Round Table

Bob Bavirsha assisted an animal control officer in Kankakee with a rescue of a 7-foot starved tiger retic.

Linda offered thanks Bob Henderson and the Milwaukee Public Museum for treating the CHS so well at the November 7 Snake Day event.

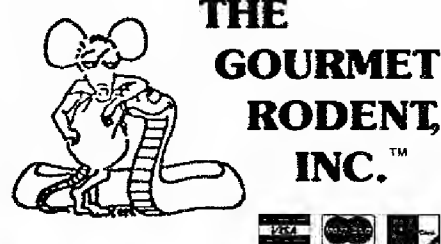
Cindy shared the story of the USF&W officer in Florida who lost the alligator with its mouth taped shut.

The CHS owes a debt of gratitude to Mike Dreslik and Jennifer Mui of the Illinois Natural History Survey for the donation of the wonderful species cards and laminated Illinois Herp posters.

Mike Dloogatch mentioned the possibility of a board meeting at The Grove in Glenview next year.

The meeting adjourned at 8:52 P.M.

Respectfully submitted by recording secretary Cindy Rampacek



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UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, December 30, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **This meeting will be a holiday party.** The CHS will provide soft drinks and snacks. If you would like to bring something edible to share with the group, you are invited to do so. If you would like to bring an animal to show off to the group, you are encouraged to do that as well. This will be a chance to socialize all evening and get to know your fellow members a little better.

Ray Pawley will speak at the January 27, 2010, meeting. Ray is a retired curator of reptiles at Brookfield Zoo, who now makes his home near Hondo, New Mexico. Ray will speak about some of his experiences raising Galapagos tortoises at Brookfield and some questions that were left unanswered. In his own words, “While lectures are basically informative (period), this topic is unique in that the audience will be informed AND will hear about some intriguing unanswered questions that arose while we were raising Galapagos tortoises at Brookfield Zoo. The goal of this talk is to share with the audience what we learned in hopes that some individual(s) might want to seek some answers through their own initiative.”

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago’s newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

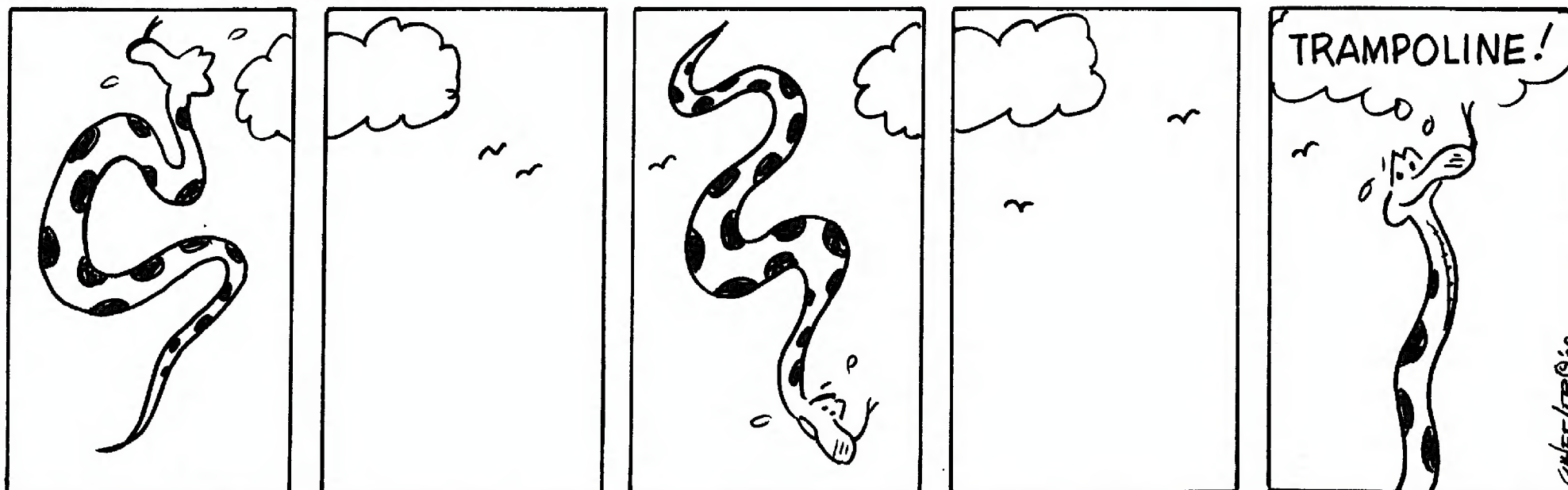
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., December 18, in the adult meeting room on the second floor of the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the CTC website: <http://www.geocities.com/~chicagoturtle>.

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